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EXAMINER
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ART UNIT	PAPER NUMBER
1791	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/591,056	TERAO ET AL.	
	Examiner	Art Unit	
	JEFFREY WOLLSCHLAGER	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 April 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4 and 6-19* is/are pending in the application.

4a) Of the above claim(s) *15-19* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4 and 6-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Applicant's amendment to the claims filed April 7, 2010 has been entered. Claim 5 has been canceled. Claim 1 is currently amended. Claims 15-19 remain withdrawn from further consideration. Claims 1-4 and 6-14 are under examination. Applicant's amendment to the claims has overcome the objection to claim 9 and the 35 USC 112 second paragraph rejection of claim 3.

Specification

The amendment filed April 7, 2010 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the change of classification of Experiment 2 in Table 1 to a comparative example. It is submitted that the original disclosure discloses that experiment 2 is not a comparative example and there is nothing to suggest that the lack of such a designation is an obvious typographical error. It is unclear to the examiner how the designation is changeable, without changing the "matter" of the original disclosure, merely because prosecution has yielded a claim presumably narrower than the experimental example disclosed. Further, while the instant disclosure does discuss that viscosity above 3000 Pa-sec can be problematic; the disclosure does not say that it is problematic in all cases, only in "some cases" (paragraph [0051] of the published application). Similarly, paragraphs [0046] and [0047] of the published application (e.g. last sentence of paragraph [0046]) make it clear that values outside of the 30-70% vol. window can also be employed. Even further, original claim 1 makes

it clear the invention was not originally intended to be limited to such a window. Accordingly, the examiner submits that the designation of experiment 2 as a comparative example is not proper.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4 and 6-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ford et al. (US 5,213,737) in view of JP 1121174 (IDS document) or JP 2000-238023 (IDS document).

Regarding claims 1-4 and 6-14, Ford et al. teach the basic claimed process of extruding a ceramic article comprising extruding the material in an extrusion molding machine in which a discharge outlet of a twin screw extruder and a material feed opening of a single screw extruder are connected (Abstract; col. 5, line 60-col. 6, line 10; Figure 1) and extruding the material through a die (Figure 1). Ford et al. do not explicitly teach extruding the ceramic sheet through

a die that produces a sheet with a thickness of from 1 to 10 mm. However, JP 1121174 teaches a method of extruding ceramic materials wherein they teach that it is known to extrude ceramic materials in sheet form to produce a sheet having a thickness of 1-5 mm (Abstract) and JP 2000-238023 teaches a method of extruding aluminum nitride powder in sheet form wherein the sheet has a thickness of 1.175 mm (Abstract; Example). Claims 2-4 and 6-14 do not appear to claim any features that are not disclosed or rendered obvious in view of the applied art.

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have combined the teaching of Ford et al. with either of JP 1121174 or JP 2000-238023 and to have used the process of Ford et al. to extrude a sheet having a thickness of 1.175 mm or 1-5 mm since Ford et al. teach and suggest their method is well suited for extruding ceramic powder materials and each of JP 1121174 and JP 2000-238023 suggest the extruded ceramic in sheet forms within the claimed range of thickness are known to be suited for a variety of applications. The examiner submits that one having ordinary skill would have had at least a reasonable expectation of success when attempting to produce a ceramic sheet having a thickness within the claimed range by the method of Ford et al. and would have been motivated to do so in view of the teaching of JP 1121174 or JP 2000-238023.

Claims 1-4 and 6-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuruta et al. (US 2002/0014710) in view of any of Ford et al. (US 5,213,737) or Rosato (Extruding Plastics – A Practical Processing Handbook; 1998; page 55) or McCullough et al. (US 4,663,103).

Regarding claims 1-4 and 6-14, Tsuruta et al. teach a method for molding a ceramic sheet comprising extruding a ceramic material through a two stage extruder system wherein the discharge of the first extruder is connected to the feed opening of the second extruder and the

material is extruded through a die to produce a sheet that is up to about 1.5 mm thick (paragraph [0034]; Figures 1-4). Tsuruta et al. do not teach the first extruder screw is a twin screw extruder. However, Ford et al. teach and suggest such an extruder screw configuration (col. 5, line 60-col. 6, line 10); Rosato (page 55) teach that twin screw extruders are better at mixing materials while single screw extruders are better at pumping (i.e. thrust capacity); and McCullough et al. (col. 3, lines 1-24) suggest that it is well established in the extrusion art to compound/mix powder materials in a twin screw extruder followed by melt pumping the material in a single screw extruder through a sheet die (col. 3, lines 1-24).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have modified the method of Tsuruta et al. and to have employed a first twin screw extruder followed by a second single screw extruder, as suggested by Ford et al., since Ford et al. suggest that such a configuration is an alternative configuration known to be suitable in the art of extruding ceramic materials (MPEP 2144.06-2144.07).

Alternatively, it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have modified the method of Tsuruta et al. and to have employed a twin screw extruder as the first extruder since Rosato et al. teach that it is known in the art that twin-screw extruders provide improved mixing relative to single screw extruder. Further, one having ordinary skill would have found it obvious to have continued to employ a single screw extruder in the method of Tsuruta et al. since Rosato et al. also make it clear that single screw extruders are better suited for pumping/generating pressure (e.g. suited for extrusion through a sheet die).

In a third alternative, it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to have modified the method of Tsuruta et al. and to have employed a twin screw extruder as the first extruder and a single screw as the second

extruder since McCullough et al. suggest that such a configuration is a well known solution for mixing and melt pumping powdered materials in the extrusion art for sheet forming applications (MPEP 2144.06-2144.07).

Claims 2-4 and 6-14 do not appear to claim any features that are not disclosed or rendered obvious in view of the applied art.

Response to Arguments

Applicant's arguments filed April 7, 2010 have been fully considered, but they are not persuasive. Applicant argues that the now recited volume range of the kneading portion of the twin screw extruder has been found to be critical and that the prior art does not teach the range or its criticality. This argument is not persuasive.

As an initial matter, the examiner notes the phrase 'kneading portion' of the extruder is not particularly limited or defined in the instant application. As such, a broad reasonable interpretation of what is considered to be "kneading" is proper, and that from this starting point, almost any desired sections of a twin screw extruder could be added to or excluded from the "kneading portion" to meet the required volume %. For example, all of the extruder after which the material has melted could be considered a "kneading" portion. Alternatively, all of the extruder from the feed zone (i.e. the zone where the unmelted feed is mixed/kneaded) to the last kneading block in the melt zone could be considered kneading while the following section(s) prior to discharge from the extruder could be considered a pumping/compression section instead of a kneading section. The language in the instant disclosure is generic and as set forth above in the previous sentences somewhat problematic for distinguishing over the basic nature of a twin-screw extruder (i.e. there is "kneading" that arguably occurs throughout the extruder depending on what sections are being emphasized).

In a narrower interpretation of “kneading”, twin screw extruders typically employ "kneading blocks/discs/elements" to provide more dispersive mixing than would occur without such elements. It is not clear whether the intention is to limit the claims to such elements. However, the examiner submits that such a narrower interpretation would also be rendered obvious over the prior art. For example, US 4,663,103 employed above in the rejection, employs an extruder wherein, after calculation, about 30% (specifically 29%), of the extruder is occupied with kneading blocks (Figure 2; col. 7, line 65-col. 10, line 37). Similarly, IDS document JP60-204302 shows an arrangement suggesting kneading blocks within the claimed range (Figures 3, 4 and 7). Additionally, US 6,495,260 (Example 4) discloses an extruder with 50% of the extruder being occupied by kneading sections. Similar configurations are shown US 7,265,187 (Figure 1); US 6,790,025; US 6,419,864; US 4,824,256 and US 6,472,460.

Further, applicant’s argument that the range of 30-70 volume % constitute a critical range is not persuasive for the reasons set forth above. Further, it is noted that the "critical" range substantially covers half of the entire range that could be covered. Since a twin screw extruder essentially has two functions: 1) mixing/kneading/dispersing and 2) conveying/forwarding/pumping it is unclear how using 50%+/- 20% of the total volume of the extruder to accomplish of one of the two functions (i.e. about 50% of the function of the extruder is claimed to take place in 50% +/- 20% of the volume of the extruder) is understood to be critical, as opposed to a value readily determined through routine optimization and experimentation in the extrusion art. Further, the examiner submits the instant disclosure does not make it clear that such a range is required to achieve the results of the desired invention (i.e. it does not clearly show it is “critical’). For example, paragraphs [0046] and [0047] of the published application appear to suggest that such a configuration is more of a preferred embodiment than a critical range (e.g. after stating that the kneading portion of the extruder

“usually” occupies from 30-70% of the volume the last sentence of paragraph [0046] states: “The screw constitution of the twin extruder is not particularly limited but is preferably selected considering the kneaded clay being uniformly kneaded."). The examiner submits that the claims would need to be amended to overcome the art of record.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JEFFREY WOLLSCHLAGER whose telephone number is (571)272-8937. The examiner can normally be reached on Monday - Thursday 6:45 - 4:15, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeff Wollschlager/
Primary Examiner
Art Unit 1791

June 16, 2010